CDM FEDERAL PROGRAMS CORPORATION

January 29, 1993

ENFORCEMENT SENSITIVE

Mr. Ken Herstowski
U. S. Environmental Protection Agency
Region VII RCRA Branch
726 Minnesota Avenue
Kansas City, Kansas 66101

Project: ARCS Regions VI, VII, & VIII, Contract No. 68-W9-0021
DCN: 7760-017-B8-RT-CMYV
Subject: Final Report for the Eagle Signal Site (EPA ID No.: IAD051001337)

Dear Mr. Herstowski:

CDM Federal Programs Corporation (CDM Federal) is pleased to submit this Final Report for the Eagle Signal site. We have addressed all comments on the Draft Final Report received on December 7, 1992. Attached is a summary of our responses to the reviewers' comments and the PA Scoresheets.

Eagle Signal located in Davenport, Scott County, Iowa was established in 1966 for manufacturing electromechanical and solid-state industrial timers and controls. Eagle Signal is still in operation at this time, and currently employs 52 workers. Hazardous wastes used and stored at the facility include paint sludge from electroplating, spent waste solvents from parts washers and paint booth, and waste oil from the machining operations.

The Visual Site Inspection (VSI) at the site was conducted by CDM Federal Programs Corporation (CDM Federal) on May 13, 1992. Eagle Signal covers approximately 1.2 acres of the total area (6 acres) leased out by Shultz Properties. No releases were observed during the VSI, and there have been no reports of releases. All hazardous wastes are stored in the Paint and Hazardous Waste Storage Area located in the northeast corner of the west building.

An overall PA score of 11.1 was calculated for the site. The groundwater pathway score, with no suspected release, but a secondary target population of 3,568 individuals is 10.3. The surface water pathway score, with no suspected release, is 5.2. The soil pathway score, with an onsite worker population of 52, is 4.1. The air pathway score, with no suspected release, is 18.4.

Groundwater Pathway

A groundwater pathway score of 10.3 included no primary targets because there is no suspected release to groundwater. Surface water is the primary source of drinking water within a 4-mile radius of the site. Rural residents use groundwater as the source of drinking water. The secondary target population is estimated to include 3,568 persons who are using private wells within a 4-mile radius of the site. There have been no reports of contamination of any of these drinking water supplies.

8215 Melrose Drive, Suite 100 Lenexa, KS 66214 913 492-8181

Surface Water Pathway

A surface water pathway score was calculated to be 5.2. The Mississippi River is located about 0.5 miles south of the site. The City of Davenport, City of Moline, City of Bettendorf, and City of Rock Island, within a 4-mile radius of the site obtain drinking water from the Mississippi River, but the intakes are located upstream of the site. The surface water score remains low because the flow rate of the Mississippi River is high (64,592 cfs), and there are no surface water intakes for drinking water within 15 miles downstream of the site.

Soil Exposure Pathway

The soil exposure pathway score is 4.1, based on no resident population within 200 feet, and 52 workers employed at the Eagle Signal facility. There are no reports of releases to soil at the Eagle Signal facility. All of the hazardous wastes generated onsite are stored in the facility building.

Air Pathway

The air pathway score of 18.4 is calculated with no suspected release. There is no reported release of contaminants to the air at the Eagle Signal facility.

SWMU/AOCs

Fourteen solid waste management units (SWMUs) and two areas of concern (AOCs) were identified at the Eagle Signal site. None of the identified SWMUs or AOCs are recommended for additional activity (i.e., sampling) The attached table, SWMU Identification Summary, presents the identified SWMUs and AOCs, their years of operation, wastes managed, and recommendation.

Recommendations

No further action is recommended at this site.

If you have any questions, please call me at (913) 492-8181.

Sincerely,

CDM FEDERAL PROGRAMS CORPORATION

Philip C. Dula

Philip C. Dula, P.G.
Project Manager

Attachments

cc: DC
RF

EGSG.129

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SWMU and AOC Identification Summary Table

Eagle Signal of Davenport
Scott County, Iowa

Unit	Name of Unit	Years of Operation	Waste Managed	Evidence of Release	Recommendation		
					No Further Action	Further Assessment	Sampling
SWMU							
1	Holding Pits	1966 to date	Wastewater from plating process	None	X		
2	Plating Department	1966 to date	Plating Sludges (D002)	None	X		
3	SAU for Storage of Paper Filters	1966 to date	Non-hazardous paper filters coated with paint	None	X		
4	SAU for Storage of Paint Waste	1966 to date	Paint sludge, paint thinner, silkscreen wastes and solvents, process paint drums and pails. Hazardous waste (F007, F008, F009, P098)	None	X		
5	Paint and Hazardous Waste Storage Area	1966 to date	Spent solvents	None	X		

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SWMU and AOC Identification Summary Table

Eagle Signal of Davenport
Scott County, Iowa

Unit	Name of Unit	Years of Operation	Waste Managed	Evidence of Release	Recommendation		
					No Further Action	Further Assessment	Sampling
6-11	Solvent Parts Washers	1966 to date	Non-hazardous paper filters containing metal shavings	None	X		
12	Storage Area for Maintenance Department	1966 to date	Raw product oil and used waste oil	None	X		
13	Raw Material and Waste Oil Storage Area	1966 to date	Lacquer washup solvent (F006) containing ketone, toluene, and alcohol	None	X		
14	Silkscreening Area SAUs	1966 to date	Waste chemicals from production process	None	X		

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SWMU and AOC Identification Summary Table

Eagle Signal of Davenport
Scott County, Iowa

Unit	Name of Unit	Years of Operation	Waste Managed	Evidence of Release	Recommendation		
					No Further Action	Further Assessment	Sampling
AOC							
1	Former Open Drum Storage Area	1966 to 1984	Product chemicals and new raw materials used in plating process	None	X		
2	Plating Raw Material Storage Area	1966 to date	Non-contact cooling water	None	X		

EAGLESIG.SWM

SWMU - Solid Waste Management Units
AOC - Area of Concern
SAU - Satellite Accumulation Unit

FPC RESPONSES TO COMMENTS

Re: Draft Final Report for the Eagle Signal site.
Comments Submitted By:
Comments Received: November 13, 1992

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NO.			RESPONSES
1	a.	Comment:	"Section 3.3 - Direction of groundwater flow within the bedrock aquifer (Middle Devonian Wapsipinicon Formation) should be indicated, at least on a regional scale if local information is unavailable."
		Response:	Flow is to the south for the shallow aquifer. Flow is to the west for the Devonian aquifer. Report has been revised.
	b.	Comment:	"Section 3.3 - The second paragraph on page 303 describes soils in the vicinity of Washington, Iowa. Eagle Signal is in Davenport. Please provide the soil description for Davenport in the final report."
		Response:	Soil information was provided for Davenport, IA, but wrong city name was used. Report has been revised.
2		Comment:	"Section 4.0 - The visual site inspection is, in part, intended to evaluate the physical condition of the SWMUs. No information is provided regarding the existing condition of the SWMUs. This must be provided in the final report."
		Response:	Report has been revised as suggested.

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CONFIDENTIAL

PA Scoresheets

CONFIDENTIAL

Site Name: Eagle Signal

CERCLIS ID No.: IAD051001337

Street Address: 736 Federal St.

City/State/Zip: Davenport, IA 52803

Investigator: Deepak Bhunge

Agency/Organization: CDM Federal Prog. Corp

Street Address: 8215 Melrose Dr., Suite 101

City/State/Zip: Lenexa, KS 66214

Date: August 5, 1992

INSTRUCTIONS FOR SCORESHEETS

Introduction

This scoresheets package functions as a self-contained workbook providing all of the basic tools to apply collected data and calculate a PA score. Note that a computerized scoring tool, "PA-Score," is also available from EPA (Office of Solid Waste and Emergency Response, Directive 9345.1-11). The scoresheets provide space to:

- Record information collected during the PA
- Indicate references to support information
- Select and assign values ("scores") for factors
- Calculate pathway scores
- Calculate the site score

Do not enter values or scores in shaded areas of the scoresheets. You are encouraged to write notes on the scoresheets and especially on the Criteria Lists. On scoresheets with a reference column, indicate a number corresponding to attached sources of information or pages containing rationale for hypotheses; attach to the scoresheets a numbered list of these references. Evaluate all four pathways. Complete all Criteria Lists, scoresheets, and tables. Show calculations, as appropriate. If scoresheets are photocopy reproduced, copy and submit the numbered pages (right-side pages) only.

GENERAL INFORMATION

Site Description and Operational History: Briefly describe the site and its operating history. Provide the site name, owner/operator, type of facility and operations, size of property, active or inactive status, and years of waste generation. Summarize waste treatment, storage, or disposal activities that have or may have occurred at the site; note also if these activities are documented or alleged. Identify probable source types and prior spills. Summarize highlights of previous investigations.

Probable Substances of Concern: List hazardous substances that have or may have been stored, handled, or disposed at the site, based on your knowledge of site operations. Identify the sources to which the substances may be related. Summarize any existing analytical data concerning hazardous substances detected onsite, in releases from the site, or at targets.

GENERAL INFORMATION

Site Description and Operational History:

Eagle Signal is located at 736 Federal Street, Scott County, Davenport, Iowa, approximately a quarter of a mile from the Mississippi River. The facility grounds encompass approximately 50,000 square feet. Fifty-two people are employed at the facility. Eagle Signal occupies the first floors of the 5-story manufacturing building and the 3-story manufacturing addition.

Eagle Signal began production in 1966. The facility manufactures parts used in mechanical-electrical control equipment (for example, timers and controls). Operations at the facility include machining, parts washing, plating, painting, silkscreening, and assembly. ~~Current~~ Since early 1980s, all assembly work is done in Austin, Texas.

Probable Substances of Concern:
(Previous investigations, analytical data)

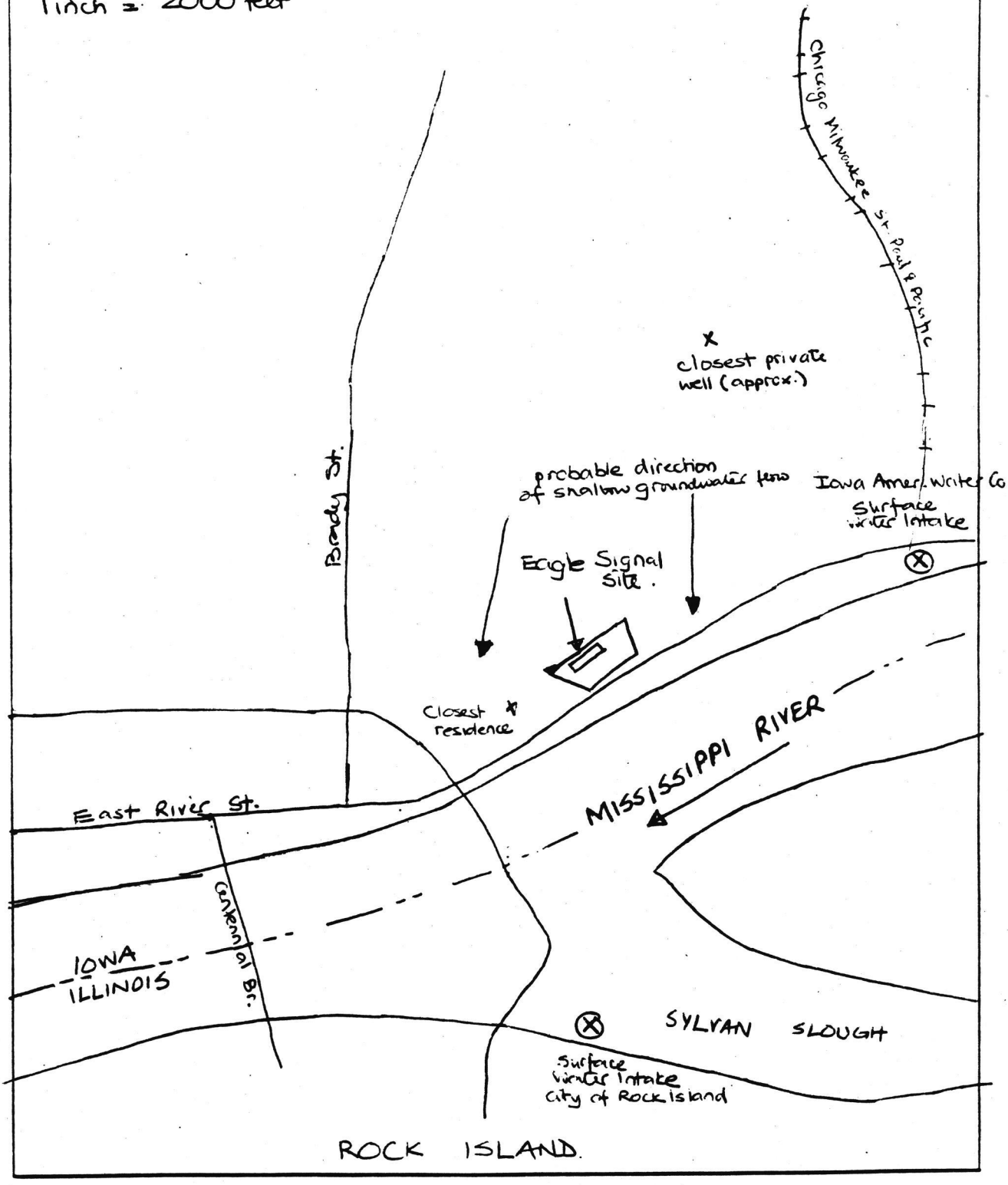
Hazardous wastes generated at the Eagle-Signal facility include:

- plating sludges (D002) containing zinc, chromium and copper.
- waste paint and spent thinner solvent (F005)
- spent naptha solvent (D001)
- silkscreening lacquer wash up solvent (F006) containing ketone, toluene and alcohol.

Site Sketch: Prepare a sketch of the site (freehand is acceptable). Indicate all pertinent features of the site and nearby environs, including: waste sources, buildings, residences, access roads, parking areas, drainage patterns, water bodies, vegetation, wells, sensitive environments, etc.

North

Site Sketch:
(Show all pertinent features, indicate sources and closest targets, indicate north)



SOURCE EVALUATION

- Number and name each source (e.g., 1. East Drum Storage Area, 2. Sludge Lagoon, 3. Battery Pile).
- Identify source type according to the list below.
- Describe the physical character of each source (e.g., dimensions, contents, waste types, containment, operating history).
- Show waste quantity (WQ) calculations for each source for appropriate tiers. Refer to instructions opposite page 5 and PA Tables 1a and 1b. Identify waste quantity tier and waste characteristics (WC) factor category score (for a site with a single source, according to PA Table 1a). Determine WC from PA Table 1b for the sum of source WQs for a multiple-source site.
- Attach additional sheets if necessary.
- Determine the site WC factor category score and record at the bottom of the page.

Source Type Descriptions

Landfill: an engineered (by excavation or construction) or natural hole in the ground into which wastes have been disposed by backfilling, or by contemporaneous soil deposition with waste disposal, covering wastes from view.

Surface Impoundment: a topographic depression, excavation, or diked area, primarily formed from earthen materials (lined or unlined) and designed to hold accumulated liquid wastes, wastes containing free liquids, or sludges that were not backfilled or otherwise covered during periods of deposition; depression may be dry if deposited liquid has evaporated, volatilized or leached, or wet with exposed liquid; structures that may be more specifically described as lagoon pond, aeration pit, settling pond, tailings pond, sludge pit, etc.; also a surface impoundment that has been covered with soil after the final deposition of waste materials (i.e., buried or backfilled).

Drums: portable containers designed to hold a standard 55-gallon volume of wastes.

Tanks and Non-Drum Containers: any stationary device, designed to contain accumulated wastes, constructed primarily of fabricated materials (such as wood, concrete, steel, or plastic) that provide structural support; any portable or mobile device in which waste is stored or otherwise handled.

Contaminated Soil: soil onto which available evidence indicates that a hazardous substance was spilled, spread, disposed, or deposited.

Pile: any non-containerized accumulation above the ground surface of solid, non-flowing wastes; includes open dumps. Some types of piles are: Chemical Waste Pile -- consists primarily of discarded chemical products, by-products, radioactive wastes, or used or unused feedstocks; Scrap Metal or Junk Pile -- consists primarily of scrap metal or discarded durable goods such as appliances, automobiles, auto parts, or batteries, composed of materials suspected to contain or have contained a hazardous substance; Tailings Pile -- consists primarily of any combination of overburden from a mining operation and tailings from a mineral mining, beneficiation, or processing operation; Trash Pile -- consists primarily of paper, garbage, or discarded non-durable goods which are suspected to contain or have contained a hazardous substance.

Land Treatment: landforming or other land treatment method of waste management in which liquid wastes or sludges are spread over land and tilled, or liquids are injected at shallow depths into soils.

Other: a source that does not fit any of the descriptions above; examples include contaminated building, ground water plume with no identifiable source, storm drain, dry well, and injection well.

SOURCE EVALUATION

Source No.: 1	Source Name: Drums	Source Waste Quantity (WQ) Calculations:
Source Description: 55-gallon drums are used for storing clean raw product and used waste. Estimated no. of drums. 1. Plating Dept. 4 drums 2. Paint Booth 2 drums 3. Silk Screening Opern. 2 drums 4. Paint & Haz. Waste Storage Room 25 drums (max. capacity) 5. Waste Oil 2 drums		Exact no. of drums at each source is not known. Total no. of drums at the facility is expected to be less than 100. WQ value (for multiple sources based on volume) $= \frac{100}{10} = 10$

Source No.: 2	Source Name: Tanks	Source Waste Quantity (WQ) Calculations:
Source Description: 1. 4 Holding pits (10'x10'x12' = 1200 cu.ft) x 4 x 4 — 35,904 gal. 2. Plating Tanks 20 tanks ea. 250 gal — 5,000 gal 3. Sweco Machines 100 + 250 — 350 gal Total 41,234 gal. Assume 50,000 gal.		Exact volume of tanks not known. Total volume (max.) 50,000 gal. WQ value (for multiple sources based on volume) $= \frac{50,000}{500} = 100$

Source No.:	Source Name:	Source Waste Quantity (WQ) Calculations:
Source Description:		WQ Total = 10 (drums) + 100 (tanks) = 110 WC (from Table 1b) = 32

Site WC: 32

WASTE CHARACTERISTICS (WC) SCORES

WC, based on waste quantity, may be determined by one or all of four measures called "tiers": constituent quantity, wastestream quantity, source volume, and source area. PA Table 1a (page 5) is divided into these four tiers. The amount and detail of information available determine which tier(s) to use for each source. For each source, evaluate waste quantity by as many of the tiers as you have information to support, and select the result that gives you the highest WC score. If minimal, incomplete, or no information is available regarding waste quantity, assign a WC score of 18 (minimum).

PA Table 1a has 6 columns: column 1 indicates the quantity tier; column 2 lists source types for the four tiers; columns 3, 4, and 5 provide ranges of waste amount for sites with only one source, which correspond to WC scores at the top of the columns (18, 32, or 100); column 6 provides formulas to obtain source waste quantity (WQ) values at sites with multiple sources.

To determine WC for sites with only one source:

1. *Identify source type (see descriptions opposite page 4).*
2. *Examine all waste quantity data available.*
3. *Estimate the mass and/or dimensions of the source.*
4. *Determine which quantity tiers to use based on available source information.*
5. *Convert source measurements to appropriate units for each tier you can evaluate for the source.*
6. *Identify the range into which the total quantity falls for each tier evaluated (PA Table 1a).*
7. *Determine the highest WC score obtained for any tier (18, 32, or 100, at top of PA Table 1a columns 3, 4, and 5, respectively).*
8. *Use this WC score for all pathways.* •

To determine WC for sites with multiple sources:

1. *Identify each source type (see descriptions opposite page 4).*
2. *Examine all waste quantity data available for each source.*
3. *Estimate the mass and/or dimensions of each source.*
4. *Determine which quantity tiers to use for each source based on the available information.*
5. *Convert source measurements to appropriate units for each tier you can evaluate for each source.*
6. *For each source, use the formulas in column 6 of PA Table 1a to determine the WQ value for each tier that can be evaluated. The highest WQ value obtained for any tier is the WQ value for the source.*
7. *Sum the WQ values for all sources to get the site WQ total.*
8. *Use the site WQ total from step 7 to assign the WC score from PA Table 1b.*
9. *Use this WC score for all pathways.* •

• The WC score is considered in all four pathways. However, if a primary target is identified for the ground water, surface water, or air migration pathway, assign the determined WC or a score of 32, whichever is greater, as the WC score for that pathway.

PA TABLE 1: WASTE CHARACTERISTICS (WC) SCORES

PA Table 1a: WC Scores for Single Source Sites and Formulas for Multiple Source Sites

TIER	SOURCE TYPE	SINGLE SOURCE SITES (assigned WC scores)			MULTIPLE SOURCE SITES
		WC = 18	*WC = 32*	*WC = 100*	Formula for Assigning Source WC Values
CONSTITUENT	N/A	≤100 lb	>100 to 10,000 lb	>10,000 lb	*lb ÷ 1*
WASTESTREAM	N/A	≤500,000 lb	>500,000 to 50 million lb	>50 million lb	*lb ÷ 5,000*
VOLUME	Landfill	≤6.75 million ft³ ≤250,000 yd³	>6.75 million to 675 million ft³ >250,000 to 25 million yd³	>675 million ft³ >25 million yd³	*ft³ ÷ 67,500* *yd³ ÷ 2,500*
	Surface impoundment	≤6,750 ft³ ≤250 yd³	>6,750 to 675,000 ft³ >250 to 25,000 yd³	>675,000 ft³ >25,000 yd³	*ft³ ÷ 67.5* *yd³ ÷ 2.5*
	Drums	≤1,000 drums	>1,000 to 100,000 drums	>100,000 drums	*drums ÷ 10*
	Tanks and non-drum containers	≤50,000 gallons	>50,000 to 5 million gallons	>5 million gallons	*gallons ÷ 500*
	Contaminated soil	≤6.75 million ft³ ≤250,000 yd³	>6.75 million to 675 million ft³ >250,000 to 25 million yd³	>675 million ft³ >25 million yd³	*ft³ ÷ 67,500* *yd³ ÷ 2,500*
	Pile	≤6,750 ft³ ≤250 yd³	>6,750 to 675,000 ft³ >250 to 25,000 yd³	>675,000 ft³ >25,000 yd³	*ft³ ÷ 67.5* *yd³ ÷ 2.5*
	Other	≤6,750 ft³ ≤250 yd³	>6,750 to 675,000 ft³ >250 to 25,000 yd³	>675,000 ft³ >25,000 yd³	*ft³ ÷ 67.5* *yd³ ÷ 2.5*
AREA	Landfill	≤340,000 ft² ≤7.8 acres	>340,000 to 34 million ft² >7.8 to 780 acres	>34 million ft² >780 acres	*ft² ÷ 3,400* *acres ÷ 0.078*
	Surface impoundment	≤1,300 ft² ≤0.029 acres	>1,300 to 130,000 ft² >0.029 to 2.9 acres	>130,000 ft² >2.9 acres	*ft² ÷ 13* *acres ÷ 0.00029*
	Contaminated soil	≤3.4 million ft² ≤78 acres	>3.4 million to 340 million ft² >78 to 7,800 acres	>340 million ft² >7,800 acres	*ft² ÷ 34,000* *acres ÷ 0.78*
	Pile*	≤1,300 ft² ≤0.029 acres	>1,300 to 130,000 ft² >0.029 to 2.9 acres	>130,000 ft² >2.9 acres	*ft² ÷ 13* *acres ÷ 0.00029*
	Land treatment	≤27,000 ft² ≤0.62 acres	>27,000 to 2.7 million ft² >0.62 to 62 acres	>2.7 million ft² >62 acres	*ft² ÷ 270* *acres ÷ 0.0062*

1 ton = 2,000 lb = 1 yd³ = 4 drums = 200 gallons

* Use area of land surface under pile, not surface area of pile.

PA Table 1b: WC Scores for Multiple Source Sites

WC Total	*WC Score*
>0 to 100	18
>100 to 10,000	32
>10,000	100

GROUND WATER PATHWAY

Ground Water Use Description: Provide information on ground water use in the vicinity. Present the general stratigraphy, aquifers used, and distribution of private and municipal wells.

Calculations for Drinking Water Populations Served by Ground Water: Provide populations from private wells and municipal supply systems in each distance category. Show apportionment calculations for blended supply systems.

GROUND WATER PATHWAY
GROUND WATER USE DESCRIPTION

Describe Ground Water Use Within 4-miles of the Site:
(Describe stratigraphy, information on aquifers, municipal and/or private wells)

The glacial drift (Pleistocene) is a surficial aquifer throughout much of Iowa. The composition of the drift is variable ranging in size from clay to boulder-sized material. The glacial drift typically produces low yields to wells.

The Devonian and Cambro-Ordovician Age rocks are the principal bedrock aquifers in the vicinity of the Eagle Signal site. The Devonian aquifer, which is a drinking water aquifer, is at about 85 feet below ground surface.

The closest drinking water well is one mile northeast of the site. There are no public water supply wells within a mile of the site. There are no Well Head Protection Areas within 4 miles of the site.

Calculations for Drinking Water Populations Served by Ground Water:

Primary source of drinking water in the vicinity of the site is surface water. Assuming residents outside city limits use groundwater as drinking water. No. of residents estimated from USGS map (USGS, 1953). Avg. household estimated at 2.5 persons (Linnenbrink, 1992)

Distance	No. of residents	Population
0 – ¼ mi	All within city limits (Davenport, Rock Island, Moline, Bettendorf)	-
¼ – ½ mi		-
½ – 1 mi		-
1-2 miles	397	993
2-3 miles	488	1220
3-4 miles	542	1355
	Total	3568

GROUND WATER PATHWAY CRITERIA LIST

This "Criteria List" helps guide the process of developing hypotheses concerning the occurrence of a suspected release and the exposure of specific targets to a hazardous substance. The check-boxes record your professional judgment in evaluating these factors. Answers to all of the listed questions may not be available during the PA. Also, the list is not all-inclusive; if other criteria help shape your hypotheses, list them at the bottom of the page or attach an additional page.

The "Suspected Release" section identifies several site, source, and pathway conditions that could provide insight as to whether a release from the site is likely to have occurred. If a release is suspected, use the "Primary Targets" section to evaluate conditions that may help identify targets likely to be exposed to a hazardous substance. Record responses for the well that you feel has the highest probability of being exposed to a hazardous substance. You may use this section of the chart more than once, depending on the number of targets you feel may be considered "primary."

Check the boxes to indicate a "yes," "no," or "unknown" answer to each question. If you check the "Suspected Release" box as "yes," make sure you assign a Likelihood of Release value of 550 for the pathway.

GROUND WATER PATHWAY CRITERIA LIST

SUSPECTED RELEASE

Yes	No	Unk	
☐	☒	☐	Are sources poorly contained?
☐	☒	☐	Is the source a type likely to contribute to ground water contamination (e.g., wet lagoon)?
☐	☒	☐	Is waste quantity particularly large?
☐	☒	☐	Is precipitation heavy?
☐	☒	☐	Is the infiltration rate high?
☐	☒		Is the site located in an area of karst terrain?
☐	☒	☐	Is the subsurface highly permeable or conductive?
☐	☒	☐	Is drinking water drawn from a shallow aquifer?
☐	☒	☐	Are suspected contaminants highly mobile in ground water?
☐	☒	☐	Does analytical or circumstantial evidence suggest ground water contamination?
☐	☒		Other criteria?_____
☐	☒		**SUSPECTED RELEASE?**

PRIMARY TARGETS

Yes	No	Unk	
☐	☒	☐	Is any drinking water well nearby?
☐	☒	☐	Has any nearby drinking water well been closed?
☐	☒	☐	Has any nearby drinking water user reported foul-tasting or foul-smelling water?
☐	☒	☐	Does any nearby well have a large drawdown or high production rate?
☐	☒	☐	Is any drinking water well located between the site and other wells that are suspected to be exposed to a hazardous substance?
☐	☒	☐	Does analytical or circumstantial evidence suggest contamination at a drinking water well?
☐	☒	☐	Does any drinking water well warrant sampling?
☐	☐		Other criteria?_____
☐	☒		**PRIMARY TARGET(S) IDENTIFIED?**

Summarize the rationale for Suspected Release (attach an additional page if necessary):

No suspected release.

Summarize the rationale for Primary Targets (attach an additional page if necessary):

No primary targets.

GROUND WATER PATHWAY SCORESHEET

Pathway Characteristics

Answer the questions at the top of the page. Refer to the Ground Water Pathway Criteria List (page 7) to hypothesize whether you suspect that a hazardous substance associated with the site has been released to ground water. Record depth to aquifer (in feet): the difference between the deepest occurrence of a hazardous substance and the depth of the top of the shallowest aquifer at (or as near as possible) to the site. Note whether the site is in karst terrain (characterized by abrupt ridges, sink holes, caverns, springs, disappearing streams). Record the distance (in feet) from any source to the nearest well used for drinking water.

Likelihood of Release (LR)

1. **Suspected Release:** Hypothesize based on professional judgment guided by the Ground Water Pathway Criteria List (page 7). If you suspect a release to ground water, use only Column A for this pathway and do not evaluate factor 2.

2. **No Suspected Release:** If you do not suspect a release, determine score based on depth to aquifer or whether the site is in an area of karst terrain. If you do not suspect a release to ground water, use only Column B to score this pathway.

Targets (T)

This factor category evaluates the threat to populations obtaining drinking water from ground water. To apportion populations served by blended drinking water supply systems, determine the percentage of population served by each well based on its production.

3. **Primary Target Population:** Evaluate populations served by all drinking water wells that you suspect have been exposed to a hazardous substance released from the site. Use professional judgment guided by the Ground Water Pathway Criteria List (page 7) to make this determination. In the space provided, enter the population served by any wells you suspect have been exposed to a hazardous substance from the site. If only the number of residences is known, use the average county residents per household (rounded up to the next integer) to determine population served. Multiply the population by 10 to determine the Primary Target Population score. Note that if you do not suspect a release, there can be no primary target population.

4. **Secondary Target Population:** Evaluate populations served by all drinking water wells within 4 miles that you do not suspect have been exposed to a hazardous substance. Use PA Table 2a or 2b (for wells drawing from non-karst and karst aquifers, respectfully) (page 9). If only the number of residences is known, use the average county residents per household (rounded to the nearest integer) to determine population served. Circle the assigned value for the population in each distance category and enter it in the column on the far-right side of the table. Sum the far-right column and enter the total as the Secondary Target Population factor score.

5. **Nearest Well** represents the threat posed to the drinking water well that is most likely to be exposed to a hazardous substance. If you have identified a primary target population, enter 50. Otherwise, assign the score from PA Table 2a or 2b for the closest distance category with a drinking water well population.

6. **Wellhead Protection Area (WHPA):** WHPAs are special areas designated by States for protection under Section 1428 of the Safe Drinking Water Act. Local/State and EPA Regional water officials can provide information regarding the location of WHPAs.

7. **Resources:** A score of 5 can generally be assigned as a default measure. Assign zero only if ground water within 4 miles has no resource use.

Sum the target scores in Column A (Suspected Release) or Column B (No Suspected Release).

Waste Characteristics (WC)

8. **Waste Characteristics:** Score is assigned from page 4. However, if you have identified any primary target for ground water, assign either the score calculated on page 4 or a score of 32, whichever is greater.

Ground Water Pathway Score: Multiply the scores for LR, T, and WC. Divide the product by 82,500. Round the result to the nearest integer. If the result is greater than 100, assign 100.

GROUND WATER PATHWAY SCORESHEET

Pathway Characteristics	
Do you suspect a release (see Ground Water Pathway Criteria List, page 71?	Yes ___ No ✓
Is the site located in karst terrain?	Yes ___ No ✓
Depth to aquifer:	30 ft
Distance to the nearest drinking water well:	5280 ft

	A Suspected Release	B No Suspected Release	References
LIKELIHOOD OF RELEASE			
1. SUSPECTED RELEASE: If you suspect a release to ground water (see page 7), assign a score of 550. Use only column A for this pathway.			—
2. NO SUSPECTED RELEASE: If you do not suspect a release to ground water, and the site is in karst terrain or the depth to aquifer is 70 feet or less, assign a score of 500; otherwise, assign a score of 340. Use only column B for this pathway.		500	1
LR =		500	
TARGETS			
3. PRIMARY TARGET POPULATION: Determine the number of people served by drinking water wells that you suspect have been exposed to a hazardous substance from the site (see Ground Water Pathway Criteria List, page 71). ___ people x 10 =			—
4. SECONDARY TARGET POPULATION: Determine the number of people served by drinking water wells that you do NOT suspect have been exposed to a hazardous substance from the site, and assign the total population score from PA Table 2. Are any wells part of a blended system? Yes ___ No ✓ If yes, attach a page to show apportionment calculations.		43	2
5. NEAREST WELL: If you have identified a primary target population for ground water, assign a score of 50; otherwise, assign the Nearest Well score from PA Table 2. If no drinking water wells exist within 4 miles, assign a score of zero.		5	2
6. WELLHEAD PROTECTION AREA (WHPA): If any source lies within or above a WHPA, or if you have identified any primary target well within a WHPA, assign a score of 20; assign 5 if neither condition holds but a WHPA is present within 4 miles; otherwise assign zero.		0	3
7. RESOURCES		5	—
T =		53	
WASTE CHARACTERISTICS			
8. A. If you have identified any primary target for ground water, assign the waste characteristics score calculated on page 4, or a score of 32, whichever is GREATER; do not evaluate part B of this factor. B. If you have NOT identified any primary target for ground water, assign the waste characteristics score calculated on page 4.		32	
WC =		32	

GROUND WATER PATHWAY SCORE: $\frac{LR \times T \times WC}{82.500}$ = (subject to a maximum of 100) **10.3**

PA TABLE 2: VALUES FOR SECONDARY GROUND WATER TARGET POPULATIONS

PA Table 2a: Non-Karst Aquifers

Distance from Site	Population	Nearest Well (choose highest)	Population Served by Wells Within Distance Category: 1 to 10	11 to 30	31 to 100	101 to 300	301 to 1,000	1,001 to 3,000	3,001 to 10,000	10,001 to 30,000	30,001 to 100,000	Greater than 100,000	Population Value
0 to ¼ mile	0	20	1	2	5	16	52	163	521	1,633	5,214	16,325	0
> ¼ to ½ mile	0	18	1	1	3	10	32	101	323	1,012	3,233	10,121	0
> ½ to 1 mile	0	9	1	1	2	5	17	52	167	522	1,668	5,224	0
> 1 to 2 miles	993	(5)	1	1	1	3	(9)	29	94	294	939	2,938	9
> 2 to 3 miles	1220	3	1	1	1	2	7	(21)	68	212	678	2,122	21
> 3 to 4 miles	1355	2	1	1	1	1	4	(13)	42	131	417	1,306	13
Nearest Well =		5										Score =	43

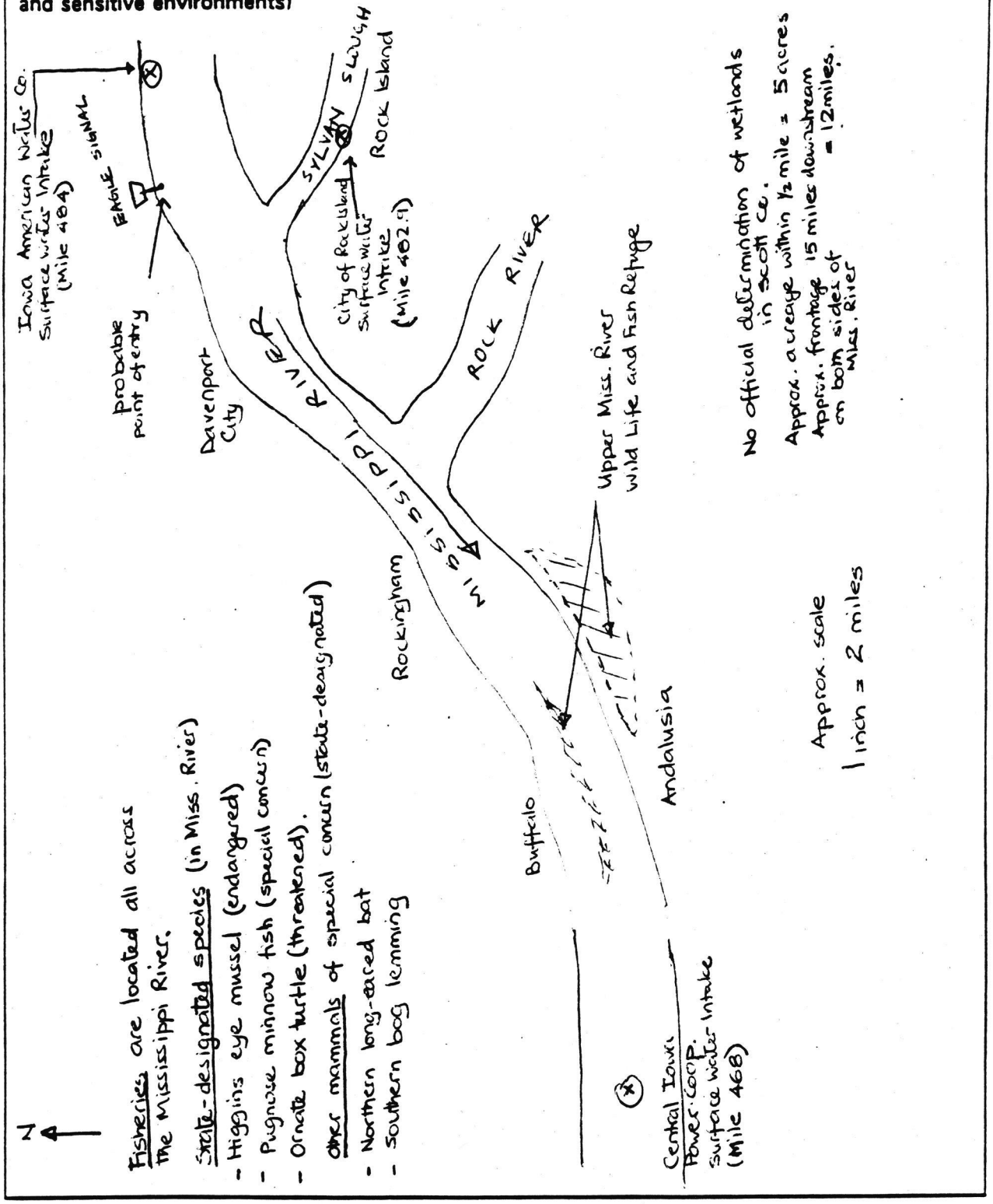
PA Table 2b: Karst Aquifers

Distance from Site	Population	Nearest Well (use 20 for karst)	Population Served by Wells Within Distance Category: 1 to 10	11 to 30	31 to 100	101 to 300	301 to 1,000	1,001 to 3,000	3,001 to 10,000	10,001 to 30,000	30,001 to 100,000	Greater than 100,000	Population Value
0 to ¼ mile		20	1	2	5	16	52	163	521	1,633	5,214	16,325	
> ¼ to ½ mile		20	1	1	3	10	32	101	323	1,012	3,233	10,121	
> ½ to 1 mile		20	1	1	3	8	26	82	261	816	2,607	8,162	
> 1 to 2 miles		20	1	1	3	8	26	82	261	816	2,607	8,162	
> 2 to 3 miles		20	1	1	3	8	26	82	261	816	2,607	8,162	
> 3 to 4 miles		20	1	1	3	8	26	82	261	816	2,607	8,162	
Nearest Well =												Score =	

Migration Route Sketch: Sketch the surface water migration pathway (freehand is acceptable) illustrating the drainage route and identifying water bodies, probable point of entry, flows, and targets.

SURFACE WATER PATHWAY
MIGRATION ROUTE SKETCH

Suface Water Migration Route Sketch:
(include runoff route, probable point of entry, 15-mile target distance limit, intakes, fisheries, and sensitive environments)



SURFACE WATER PATHWAY CRITERIA LIST

This "Criteria List" helps guide the process of developing hypotheses concerning the occurrence of a suspected release and the exposure of specific targets to a hazardous substance. The check-boxes record your professional judgment in evaluating these factors. Answers to all of the listed questions may not be available during the PA. Also, the list is not all-inclusive; if other criteria help shape your hypotheses, list them at the bottom of the page or attach an additional page.

The "Suspected Release" section identifies several site, source, and pathway conditions that could provide insight as to whether a release from the site is likely to have occurred. If a release is suspected, use the "Primary Targets" section to guide you through evaluation of some conditions that may help identify targets likely to be exposed to a hazardous substance. Record responses for the target that you feel has the highest probability of being exposed to a hazardous substance. You may use this section of the chart more than once, depending on the number of targets you feel may be considered "primary."

Check the boxes to indicate a "yes," "no," or "unknown" answer to each question. If you check the "Suspected Release" box as "yes," make sure you assign a Likelihood of Release value of 550 for the pathway.

If the distance to surface water is greater than 2 miles, do not evaluate the surface water migration pathway. Document the source of information in the text boxes below the surface water criteria list.

SURFACE WATER PATHWAY CRITERIA LIST

SUSPECTED RELEASE

Yes	No	Unk	
X	☐	☐	Is surface water nearby?
☐	X	☐	Is waste quantity particularly large?
X	☐	☐	Is the drainage area large?
☐	X	☐	Is rainfall heavy?
☐	X	☐	Is the infiltration rate low?
☐	X	☐	Are sources poorly contained or prone to runoff or flooding?
☐	X	☐	Is a runoff route well defined (e.g., ditch or channel leading to surface water)?
☐	X	☐	Is vegetation stressed along the probable run-off route?
☐	☐	X	Are sediments or water unnaturally discolored?
☐	X	☐	Is wildlife unnaturally absent?
☐	X	☐	Has deposition of waste into surface water been observed?
X	☐	☐	Is ground water discharge to surface water likely?
☐	X	☐	Does analytical or circumstantial evidence suggest surface water contamination?
☐	X		Other criteria?_____
☐	X		**SUSPECTED RELEASE?**

PRIMARY TARGETS

Yes	No	Unk	
☐	X	☐	Is any target nearby? If yes:
			☐ Drinking water intake ☐ Fishery ☐ Sensitive environment
☐	X	☐	Has any intake, fishery, or recreational area been closed?
☐	X	☐	Does analytical or circumstantial evidence suggest surface water contamination at or downstream of a target?
☐	X	☐	Does any target warrant sampling? If yes:
			☐ Drinking water intake ☐ Fishery ☐ Sensitive environment
☐	X		Other criteria?_____
☐	X		**PRIMARY INTAKE(S) IDENTIFIED?**
☐	X		**PRIMARY FISHERY(IES) IDENTIFIED?**
☐	X		**PRIMARY SENSITIVE ENVIRONMENT(S) IDENTIFIED?**

Summarize the rationale for Suspected Release (attach an additional page if necessary):

No suspected release.

Summarize the rationale for Primary Targets (attach an additional page if necessary):

No primary targets.

SURFACE WATER PATHWAY LIKELIHOOD OF RELEASE AND DRINKING WATER THREAT SCORESHEET

Pathway Characteristics

The surface water pathway includes three threats: Drinking Water Threat, Human Food Chain Threat, and Environmental Threat. Answer the questions at the top of the page. Refer to the Surface Water Pathway Criteria List (page 11) to hypothesize whether you suspect that a hazardous substance associated with the site has been released to surface water. Record the distance to surface water (the shortest overland drainage distance from a source to a surface water body). Record the flood frequency at the site (e.g., 100-yr, 200-yr). If the site is located in more than one floodplain, use the most frequent flooding event. Identify surface water use(s) along the surface water migration path and their distance(s) from the site.

Likelihood of Release (LR)

1. **Suspected Release:** Hypothesize based on professional judgment guided by the Surface Water Pathway Criteria List (page 11). If you suspect a release to surface water, use only Column A for this pathway and do not evaluate factor 2.

2. **No Suspected Release:** If you do not suspect a release, determine score based on the shortest overland drainage distance from a source to a surface water body. If distance to surface water is 2,500 feet or less, assign a score of 500. If distance to surface water is greater than 2,500 feet, determine score based on flood frequency. If you do not suspect a release to surface water, use only Column B to score this pathway.

Drinking Water Threat Targets (T)

3. List all drinking water intakes on downstream surface water bodies along the surface water migration path. Record the intake name, the type of water body on which the intake is located, the flow of the water body, and the number of people served by the intake (apportion the population if part of a blended system).

4. **Primary Target Population:** Evaluate populations served by all drinking water intakes that you suspect have been exposed to a hazardous substance released from the site. Use professional judgment guided by the Surface Water Pathway Criteria List (page 11) to make this determination. In the space provided, enter the population served by all intakes you suspect have been exposed to a hazardous substance from the site. If only the number of residences is known, use the average county residents per household (rounded up to the next integer) to determine population served. Multiply by 10 to determine the Primary Target Population score. Remember, if you do not suspect a release, there can be no primary target population.

5. **Secondary Target Population:** Evaluate populations served by all drinking water intakes within the target distance limit that you do not suspect have been exposed to a hazardous substance. Use PA Table 3 (page 13) and enter the population served by intakes for each flow category. If only the number of residences is known, use the average county residents per household (rounded to the nearest integer) to determine population served. Circle the assigned value for the population in each flow category and enter it in the column on the far-right side of the table. Sum the far-right column and enter the total as the Secondary Target Population factor score.

Gauging station data for many surface water bodies are available from USGS or other sources. In the absence of gauging station data, estimate flow using the list of surface water body types and associated flow categories in PA Table 4 (page 13). The flow for lakes is determined by the sum of flows of streams entering or leaving the lake. Note that the flow category "mixing zone of quiet flowing rivers" is limited to 3 miles from the probable point of entry.

6. **Nearest intake represents the threat posed to the drinking water intake that is most likely to be exposed to a hazardous substance.** If you have identified a primary target population, enter 50. Otherwise, assign the score from PA Table 3 (page 13) for the lowest-flowing water body on which there is an intake.

7. **Resources:** A score of 5 can generally be assigned as a default measure. Assign zero only if surface water within the target distance limit has no resource use.

Sum the target scores in Column A (Suspected Release) or Column B (No Suspected Release).

SURFACE WATER PATHWAY
LIKELIHOOD OF RELEASE AND DRINKING WATER THREAT SCORESHEET

Pathway Characteristics

Do you suspect a release (see Surface Water Pathway Criteria List, page 111)? Yes ___ No ✓
Distance to surface water: 2000 ft
Flood frequency: 100 yrs
What is the downstream distance to the nearest drinking water intake? 80 miles
Nearest fishery? 0.5 miles Nearest sensitive environment? 0.5 miles

	A Suspected Release	B No Suspected Release	References
LIKELIHOOD OF RELEASE			
1. **SUSPECTED RELEASE:** If you suspect a release to surface water (see page 11), assign a score of 550. Use only column A for this pathway.			—
2. **NO SUSPECTED RELEASE:** If you do not suspect a release to surface water, use the table below to assign a score based on distance to surface water and flood frequency. Use only column B for this pathway.		500	2,4
✓ Distance to surface water ≤ 2,500 feet — 500			
Distance to surface water > 2,500 feet, and			
Site in annual or 10-year floodplain — 500			
Site in 100-year floodplain — 400			
Site in 500-year floodplain — 300			
Site outside 500-year floodplain — 100			
LR =		500	
DRINKING WATER THREAT TARGETS			
3. Record the water body type, flow (if applicable), and number of people served by each drinking water intake within the target distance limit. If there is no drinking water intake within the target distance limit, factors 4, 5, and 6 each receive zero scores.			—
4. **PRIMARY TARGET POPULATION:** If you suspect any drinking water intake listed above has been exposed to a hazardous substance from the site (see Surface Water Pathway Criteria List, page 11), list the intake name(s) and calculate the factor score based on the total population served. ___, ___ ___ people x 10 =			—
5. **SECONDARY TARGET POPULATION:** Determine the number of people served by drinking water intakes that you do NOT suspect have been exposed to a hazardous substance from the site, and assign the total population score from PA Table 3. Are any intakes part of a blended system? Yes ___ No ✓ If yes, attach a page to show apportionment calculations.		0	1,5,6
6. **NEAREST INTAKE:** If you have identified a primary target population for the drinking water threat (factor 4), assign a score of 50; otherwise, assign the Nearest Intake score from PA Table 3. If no drinking water intake exists within the target distance limit, assign a score of zero.		0	6
7. **RESOURCES**		5	—
T =		5	

PA TABLE 3: VALUES FOR SECONDARY SURFACE WATER TARGET POPULATIONS

Surface Water Body Flow (see PA Table 4)	Population	Nearest Intake (choose highest)	Population Served by Intakes Within Flow Category: 1 to 30	31 to 100	101 to 300	301 to 1,000	1,001 to 3,000	3,001 to 10,000	10,001 to 30,000	30,001 to 100,000	100,001 to 300,000	300,001 to 1,000,000	Greater than 1,000,000	Population Value
< 10 cfs	_____	20	2	5	16	52	163	521	1,633	5,214	16,325	52,136	163,248	_____
10 to 100 cfs	_____	2	1	1	2	5	16	52	163	521	1,633	5,214	16,325	_____
> 100 to 1,000 cfs	_____	1	0	0	1	1	2	5	16	52	163	521	1,633	_____
> 1,000 to 10,000 cfs	_____	0	0	0	0	0	1	1	2	5	16	52	163	_____
> 10,000 cfs or Great Lakes	_____	0	0	0	0	0	0	0	1	1	2	5	16	_____
3-mile Mixing Zone	_____	10	1	3	8	26	82	261	816	2,607	8,162	26,068	81,663	_____
Nearest Intake =		0	No surface water intake for drinking within 15 miles downstream.										Score =	0

PA TABLE 4: SURFACE WATER TYPE / FLOW CHARACTERISTICS WITH DILUTION WEIGHTS FOR SECONDARY SURFACE WATER SENSITIVE ENVIRONMENTS

Type of Surface Water Body: Water Body Type	OR Flow	Dilution Weight
minimal stream	< 10 cfs	1
small to moderate stream	10 to 100 cfs	0.1
moderate to large stream	> 100 to 1,000 cfs	N/A
large stream to river	> 1,000 to 10,000 cfs	N/A
large river	> 10,000 cfs	N/A
3-mile mixing zone of quiet flowing streams or rivers	10 cfs or greater	N/A
coastal tidal water (harbors, sounds, bays, etc.), ocean, or Great Lakes	N/A	N/A

SURFACE WATER PATHWAY HUMAN FOOD CHAIN THREAT SCORESHEET

Likelihood of Release (LR)

LR is the same for all surface water pathway threats. Enter LR score from page 12.

Human Food Chain Threat Targets (T)

8. The only human food chain targets are fisheries. A fishery is an area of a surface water body from which food chain organisms are taken or could be taken for human consumption on a subsistence, sporting, or commercial basis. Food chain organisms include fish, shellfish, crustaceans, amphibians, and amphibious reptiles. Fisheries are delineated by changes in surface water body type (i.e., streams and rivers, lakes, coastal tidal waters, and oceans/Great Lakes) and whenever the flow characteristics of a stream or river change.

In the space provided, identify all fisheries within the target distance limit. Indicate the surface water body type and flow for each fishery. Gauging station flow data are available for many surface water bodies from USGS or other sources. In the absence of gauging station data, estimate flow using the list of surface water body types and associated flow categories in PA Table 4 (page 13). The flow for lakes is determined by the sum of flows of streams entering or leaving the lake. Note that, if there are no fisheries within the target distance limit, the Human Food Chain Threat Targets score is zero.

9. Primary fisheries are any fisheries within the target distance limit that you suspect have been exposed to hazardous substance released from the site. Use professional judgment guided by the Surface Water Pathway Criteria List (page 11) to make this determination. If you identify any primary fisheries, list them in the space provided, enter 300 as the Primary Fisheries factor score, and do not evaluate Secondary Fisheries. Note that if you do not suspect a release, there can be no primary fisheries.

10. Secondary fisheries are fisheries that you do not suspect have been exposed to a hazardous substance. Evaluate this factor only if fisheries are present within the target distance limit, but none is considered a primary fishery.

A. If you suspect a release to surface water and have identified a secondary fishery but no primary fishery, assign a score of 210.

B. If you do not suspect a release, evaluate this factor based on flow. In the absence of gauging station flow data, estimate flow using the list of surface water body types and associated flow categories in PA Table 4 (page 13). Assign a Secondary Fisheries score from the table on the scoresheet using the lowest flow at any fishery within the target distance limit. (Dilution weight multiplier does not apply to PA evaluation of this factor.)

Sum the target scores in Column A (Suspected Release) or Column B (No Suspected Release).

SURFACE WATER PATHWAY (continued)
HUMAN FOOD CHAIN THREAT SCORESHEET

LIKELIHOOD OF RELEASE		A Suspected Release	B No Suspected Release	References
Enter Surface Water Likelihood of Release score from page 12.	LR =		500	

HUMAN FOOD CHAIN THREAT TARGETS

8. Record the water body type and flow (if applicable) for each fishery within the target distance limit. If there is no fishery within the target distance limit, assign a Targets score of 0 at the bottom of the page.

Fishery Name	Water Body Type	Flow
Mississippi River - Recreational fishing	River	68,000 cfs
		cfs
		cfs
		cfs
		cfs

9. PRIMARY FISHERIES: If you suspect any fishery listed above has been exposed to a hazardous substance from the site (see Surface Water Criteria List, page 11), assign a score of 300 and do not evaluate Factor 10. List the primary fisheries:

_____, _____

_____, _____

10. SECONDARY FISHERIES

A. If you suspect a release to surface water and have identified a secondary fishery but no primary fishery, assign a score of 210.

B. If you do not suspect a release, assign a Secondary Fisheries score from the table below using the lowest flow at any fishery within the target distance limit.

Lowest Flow	Secondary Fisheries Score
< 10 cfs	210
10 to 100 cfs	30
> 100 cfs, coastal tidal waters, oceans, or Great Lakes	12

			12	1
T =			12	

SURFACE WATER PATHWAY ENVIRONMENTAL THREAT SCORESHEET

Likelihood of Release (LR)

LR is the same for all surface water pathway threats. Enter LR score from page 12.

Environmental Threat Targets (T)

11. PA Table 5 (page 16) lists sensitive environments for the Surface Water Pathway Environmental Threat. In the space provided, identify all sensitive environments located within the target distance limit. Indicate the surface water body type and flow at each sensitive environment. Gauging station flow data for many surface water bodies are available from USGS or other sources. In the absence of gauging station data, estimate flow using the list of surface water body types and associated flow categories in PA Table 4 (page 13). The flow for lakes is determined by the sum of flows of streams entering or leaving the lake. Note that if there are no sensitive environments within the target distance limit, the Environmental Threat Targets score is zero.

12. Primary sensitive environments are surface water sensitive environments within the target distance limit that you suspect have been exposed to a hazardous substance released from the site. Use professional judgment guided by the Surface Water Pathway Criteria List (page 11) to make this determination. If you identify any primary sensitive environments, list them in the space provided, enter 300 as the Primary Sensitive Environments factor score, and do not evaluate Secondary Sensitive Environments. Note that if you do not suspect a release, there can be no primary sensitive environments.

13. Secondary sensitive environments are surface water sensitive environments that you do not suspect have been exposed to a hazardous substance. Evaluate this factor only if surface water sensitive environments are present within the target distance limit, but none is considered a primary sensitive environment. Evaluate secondary sensitive environments based on flow.

- In the table provided, list all secondary sensitive environments on surface water bodies with flow of 100 cfs or less.

  1) Use PA Table 4 (page 13) to determine the appropriate dilution weight for each.

  2) Use PA Tables 5 and 6 (page 16) to determine the appropriate value for each sensitive environment type and for wetlands frontage.

  3) For a sensitive environment that falls into more than one of the categories in PA Table 5, sum the values for each type to determine the environment value (e.g., a wetland with 1.5 miles frontage (value of 50) that is also a critical habitat for a Federally designated endangered species (value of 100) would receive a total value of 150).

  4) For each sensitive environment, multiply the dilution weight by the environment type (or length of wetlands) value and record the product in the far-right column.

  5) Sum the values in the far-right column and enter the total as the Secondary Sensitive Environments score. Do not evaluate part B of this factor.

- If all secondary sensitive environments are on surface water bodies with flows greater than 100 cfs, assign 10 as the Secondary Sensitive Environments score.

Sum the target scores in Column A (Suspected Release) or Column B (No Suspected Release).

SURFACE WATER PATHWAY (continued)
ENVIRONMENTAL THREAT SCORESHEET

LIKELIHOOD OF RELEASE		A Suspected Release	B No Suspected Release	Reference
Enter Surface Water Likelihood of Release score from page 12.	LR =		500	

ENVIRONMENTAL THREAT TARGETS

11. Record the water body type and flow (if applicable) for each surface water sensitive environment within the target distance limit (see PA Tables 4 and 5). If there is no sensitive environment within the target distance limit, assign a Targets score of 0 at the bottom of the page.

Environment Name	Water Body Type	Flow
Higgins eye mussel, pugnose minnow, Ornate box turtle, Water fowls, shore birds, Northern long-eared bat, southern bog lemming	Miss. River	68,000 cfs
		cfs
		cfs
		cfs
		cfs
Wetlands		

12. **PRIMARY SENSITIVE ENVIRONMENTS:** If you suspect any sensitive environment listed above has been exposed to a hazardous substance from the site (see Surface Water Criteria List, page 11), assign a score of 300 and do not evaluate factor 13. List the primary sensitive environments:

_____, _____,
_____, _____.

13. **SECONDARY SENSITIVE ENVIRONMENTS:** If sensitive environments are present, but none is a primary sensitive environment, evaluate Secondary Sensitive Environments based on flow.

A. For secondary sensitive environments on surface water bodies with flows of 100 cfs or less, assign scores as follows, and do not evaluate part B of this factor:

Flow	Dilution Weight (PA Table 4)		Environment Type and Value (PA Tables 5 and 6)		Total
cfs		x		=	
cfs		x		=	
cfs		x		=	
cfs		x		=	
cfs		x		=	
				Sum =	

B. If all secondary sensitive environments are located on surface water bodies with flows > 100 cfs, assign a score of 10.

	A	B	Reference
		10	1
T =		10	

PA TABLE 5: SURFACE WATER AND AIR PATHWAY SENSITIVE ENVIRONMENTS VALUES

	Sensitive Environment		*Assigned Value*
	Critical habitat for Federally designated endangered or threatened species Marine Sanctuary National Park Designated Federal Wilderness Area Ecologically important areas identified under the Coastal Zone Wilderness Act Sensitive Areas identified under the National Estuary Program or Near Coastal Water Program of the Clean Water Act Critical Areas identified under the Clean Lakes Program of the Clean Water Act (subareas in lakes or entire small lakes) National Monument (air pathway only) National Seashore Recreation Area National Lakeshore Recreation Area		100
	Habitat known to be used by Federally designated or proposed endangered or threatened species National Preserve National or State Wildlife Refuge Unit of Coastal Barrier Resources System Federal land designated for the protection of natural ecosystems Administratively Proposed Federal Wilderness Area Spawning areas critical for the maintenance of fish/shellfish species within a river system, bay, or estuary Migratory pathways and feeding areas critical for the maintenance of anadromous fish species in a river system Terrestrial areas utilized for breeding by large or dense aggregations of vertebrate animals (air pathway) or semi-aquatic foragers (surface water pathway) National river reach designated as Recreational		75
	Habitat known to be used by State designated endangered or threatened species Habitat known to be used by a species under review as to its Federal endangered or threatened status Coastal Barrier (partially developed) Federally designated Scenic or Wild River		50
	State land designated for wildlife or game management State designated Scenic or Wild River State designated Natural Area	Higgins eye mussel, Pugnose minnow, Ornate box turtle Northern long-eared bat, southern bog lemming	25 0-½ mi 0-¼ mi
	Particular areas, relatively small in size, important to maintenance of unique biotic communities		
	State designated areas for protection/maintenance of aquatic life under the Clean Water Act		5
	Wetlands <50 acres		See PA Table 6 (Surface Water Pathway) or PA Table 9 (Air Pathway)

PA TABLE 6: SURFACE WATER PATHWAY WETLANDS FRONTAGE VALUES

Total Length of Wetlands	*Assigned Value*
Less than 0.1 mile	0
0.1 to 1 mile	25
Greater than 1 to 2 miles	50
Greater than 2 to 3 miles	75
Greater than 3 to 4 miles	100
Greater than 4 to 8 miles	150
Greater than 8 to 12 miles	250
Greater than 12 to 16 miles	350
Greater than 16 to 20 miles	450
Greater than 20 miles	500

12 miles of wetlands frontage (Ref 7)

SURFACE WATER PATHWAY WASTE CHARACTERISTICS, THREAT, AND PATHWAY SCORES

Waste Characteristics (WC)

14. **Waste Characteristics:** Score is assigned from page 4. However, if a primary target has been identified for any surface water threat, assign either the score calculated on page 4 or a score of 32, whichever is greater.

Surface Water Pathway Threat Scores

Fill in the matrix with the appropriate scores from the previous pages. To calculate the score for each threat: multiply the scores for LR, T, and WC; divide the product by 82,500; and round the result to the nearest integer. The Drinking Water Threat and Human Food Chain Threat are each subject to a maximum of 100. The Environmental Threat is subject to a maximum of 60. Enter the rounded threat scores in the far-right column.

Surface Water Pathway Score

Sum the individual threat scores to determine the Surface Water Pathway Score. If the sum is greater than 100, assign 100.

SURFACE WATER PATHWAY (concluded)
WASTE CHARACTERISTICS, THREAT, AND PATHWAY SCORE SUMMARY

WASTE CHARACTERISTICS

	A Suspected Release	B No Suspected Release
14. A. If you have identified any primary target for surface water (pages 12, 14, or 15), assign the waste characteristics score calculated on page 4, or a score of 32, whichever is GREATER; do not evaluate part B of this factor.		[redacted]
B. If you have NOT identified any primary target for surface water, assign the waste characteristics score calculated on page 4.		32
WC =		32

SURFACE WATER PATHWAY THREAT SCORES

Threat	Likelihood of Release (LR) Score (from page 12)	Targets (T) Score (pages 12, 14, 15)	Pathway Waste Characteristics (WC) Score (determined above)	Threat Score LR x T x WC / 82,500
Drinking Water	500	5	32	0.96
Human Food Chain	500	12	32	2.33
Environmental	500	10	32	1.94

SURFACE WATER PATHWAY SCORE
(Drinking Water Threat + Human Food Chain Threat + Environmental Threat): 5.23

SOIL EXPOSURE PATHWAY CRITERIA LIST

Areas of surficial contamination can generally be assumed. This "Criteria List" helps guide the process of developing a hypothesis concerning the exposure of specific targets to a hazardous substance at the site. Use the "Resident Population" section to evaluate site and source conditions that may help identify targets likely to be exposed to a hazardous substance. The check-boxes record your professional judgment. Answers to all of the listed questions may not be available during the PA. Also, the list is not all-inclusive; if other criteria help shape your hypothesis, list them at the bottom of the page or attach an additional page.

Check the boxes to indicate a "yes," "no," or "unknown" answer to each question.

SOIL EXPOSURE PATHWAY CRITERIA LIST

SUSPECTED CONTAMINATION	*RESIDENT POPULATION*
Surficial contamination can generally be assumed.	Yes / No / Unk ☐ ☒ ☐ Is any residence, school, or daycare facility on or within 200 feet of an area of suspected contamination? ☐ ☒ ☐ Is any residence, school, or daycare facility located on adjacent land previously owned or leased by the site owner/operator? ☐ ☒ ☐ Is there a migration route that might spread hazardous substances near residences, schools, or daycare facilities? ☐ ☒ ☐ Have onsite or adjacent residents or students reported adverse health effects, exclusive of apparent drinking water or air contamination problems? ☐ ☒ ☐ Does any neighboring property warrant sampling? ☐ ☒ Other criteria? _____ ☐ ☒ RESIDENT POPULATION IDENTIFIED?

Summarize the rationale for Resident Population (attach an additional page if necessary):

Nearest resident is about 2000 feet from the site. Exposure to soil contamination by residents is not expected.

SOIL EXPOSURE PATHWAY SCORESHEET

Pathway Characteristics

Answer the questions at the top of the page. Identify people who may be exposed to a hazardous substance because they work at the facility, or reside or attend school or daycare on or within 200 feet of an area of suspected contamination. If the site is active, estimate the number of full and part-time workers. Note that evaluation of targets is based on current site conditions.

Likelihood of Exposure (LE)

1. **Suspected Contamination:** Areas of surficial contamination are present at most sites, and a score of 550 can generally be assigned as a default measure. Assign zero, which effectively eliminates the pathway from further consideration, only if there is no surficial contamination; reliable analytical data are generally necessary to make this determination.

Resident Population Threat Targets (T)

2. **Resident Population** corresponds to "primary targets" for the migration pathways. Use professional judgment guided by the Soil Exposure Pathway Criteria List (page 18) to determine if there are people living or attending school or daycare on or within 200 feet of areas of suspected contamination. Record the number of people identified as resident population and multiply by 10 to determine the Resident Population factor score.

3. **Resident Individual:** Assign 50 if you have identified a resident population; otherwise, assign zero.

4. **Workers:** Estimate the number of full and part-time workers at this facility and adjacent facilities where contamination is also suspected. Assign a score for the Workers factor from the table.

5. **Terrestrial Sensitive Environments:** In the table provided, list each terrestrial sensitive environment located on an area of suspected contamination. Use PA Table 7 (page 20) to assign a value for each. Sum the values and assign the total as the factor score.

6. **Resources:** A score of 5 can generally be assigned as a default measure. Assign zero only if there is no land resource use on an area of suspected contamination.

Sum the target scores.

Waste Characteristics (WC)

7. Enter the WC score determined on page 4.

Resident Population Threat Score: Multiply the scores for LE, T, and WC. Divide the product by 82,500. Round the result to the nearest integer. If the result is greater than 100, assign 100.

Nearby Population Threat Score: Do not evaluate this threat if you gave a zero score to Likelihood of Exposure. Otherwise, assign a score based on the population within a 1-mile radius (use the same 1-mile radius population you evaluate for air pathway population targets):

	Population Within One Mile	Nearby Population Threat Score
	< 10,000	1
1462	10,000 to 50,000	(2)
	>50,000	4

Soil Exposure Pathway Score: Sum the Resident Population Threat score and the Nearby Population Threat score, subject to a maximum of 100.

SOIL EXPOSURE PATHWAY SCORESHEET

Pathway Characteristics	
Do any people live on or within 200 ft of areas of suspected contamination?	Yes ___ No ✓
Do any people attend school or daycare on or within 200 ft of areas of suspected contamination?	Yes ___ No ✓
Is the facility active? Yes ✓ No ___ If yes, estimate the number of workers: 52	

	Suspected Contamination	References
LIKELIHOOD OF EXPOSURE		
1. SUSPECTED CONTAMINATION: Surficial contamination can generally be assumed, and a score of 550 assigned. Assign zero only if the absence of surficial contamination can be confidently demonstrated. LE =	550	—
RESIDENT POPULATION THREAT TARGETS		
2. RESIDENT POPULATION: Determine the number of people occupying residences or attending school or daycare on or within 200 feet of areas of suspected contamination (see Soil Exposure Pathway Criteria List, page 18). 0 people x 10 =	0	8,9
3. RESIDENT INDIVIDUAL: If you have identified a resident population (factor 2), assign a score of 50; otherwise, assign a score of 0.	0	8,9
4. WORKERS: Use the following table to assign a score based on the total number of workers at the facility and nearby facilities with suspected contamination:	5	8
5. TERRESTRIAL SENSITIVE ENVIRONMENTS: Use PA Table 7 to assign a value for each terrestrial sensitive environment on an area of suspected contamination: Sum =	0	—
6. RESOURCES	5	—
T =	10	
WASTE CHARACTERISTICS		
7. Assign the waste characteristics score calculated on page 4. WC =	32	
RESIDENT POPULATION THREAT SCORE: LE X T X WC / 82,500.	2.1	
NEARBY POPULATION THREAT SCORE:	2	5
SOIL EXPOSURE PATHWAY SCORE: Resident Population Threat + Nearby Population Threat	4.1	

Number of Workers	Score
0	0
(52) 1 to 100	5
101 to 1,000	10
>1,000	15

Terrestrial Sensitive Environment Type	Value

PA TABLE 7: SOIL EXPOSURE PATHWAY
TERRESTRIAL SENSITIVE ENVIRONMENT VALUES

Terrestrial Sensitive Environment	*Assigned Value*
Terrestrial critical habitat for Federally designated endangered or threatened species National Park Designated Federal Wilderness Area National Monument	100
Terrestrial habitat known to be used by Federally designated or proposed threatened or endangered species National Preserve (terrestrial) National or State terrestrial Wildlife Refuge Federal land designated for protection of natural ecosystems Administratively proposed Federal Wilderness Area Terrestrial areas utilized by large or dense aggregations of animals (vertebrate species) for breeding	75
Terrestrial habitat used by State designated endangered or threatened species Terrestrial habitat used by species under review for Federal designated endangered or threatened status	50
State lands designated for wildlife or game management State designated Natural Areas Particular areas, relatively small in size, important to maintenance of unique biotic communities	25

AIR PATHWAY CRITERIA LIST

This "Criteria List" helps guide the process of developing a hypothesis as to whether a release to the air is likely to be detected. The check-boxes record your professional judgment. Answers to all of the listed questions may not be available during the PA. Also, the list is not all-inclusive; if other criteria help shape your hypothesis, list them at the bottom of the page or attach an additional page.

The "Suspected Release" section identifies several conditions that could provide insight as to whether a release from the site is likely to be detected. If a release is suspected, primary targets are any residents, workers, students, and sensitive environments on or within ¼ mile of the site.

Check the boxes to indicate a "yes," "no," or "unknown" answer to each question. If you check the "Suspected Release" box as "yes," make sure you assign a Likelihood of Release value of 550 for the pathway.

AIR PATHWAY CRITERIA LIST

SUSPECTED RELEASE				PRIMARY TARGETS
Yes	No	Unk		
☐	☒	☐	Are odors currently reported?	If you suspect a release to air, evaluate all populations and sensitive environments within 1/4 mile (including those onsite) as primary targets.
☐	☒	☐	Has release of a hazardous substance to the air been directly observed?	
☐	☒	☐	Are there reports of adverse health effects (e.g., headaches, nausea, dizziness) potentially resulting from migration of hazardous substances through the air?	
☐	☒	☐	Does analytical or circumstantial evidence suggest a release to the air?	
☐	☒		Other criteria?_____	
☐	☒		**SUSPECTED RELEASE?**	

Summarize the rationale for Suspected Release (attach an additional page if necessary):

No suspected release to air.

AIR PATHWAY SCORESHEET

Pathway Characteristics

Answer the questions at the top of the page. Refer to the Air Pathway Criteria List (page 21) to hypothesize whether you suspect that a hazardous substance release to the air could be detected. Due to dispersion, releases to air are not as persistent as releases to water migration pathways and are much more difficult to detect. Develop your hypothesis concerning the release of hazardous substances to air based on "real time" considerations. Record the distance (in feet) from any source to the nearest regularly occupied building.

Likelihood of Release (LR)

1. **Suspected Release:** Hypothesize based on professional judgment guided by the Air Pathway Criteria List (page 21). If you suspect a release to air, use only Column A for this pathway and do not evaluate factor 2.

2. **No Suspected Release:** If you do not suspect a release, enter 500 and use only Column B for this pathway.

Targets (T)

3. **Primary Target Population:** Evaluate populations subject to exposure from release of a hazardous substance from the site. If you suspect a release, the resident, student, and worker populations on and within ¼ mile of the site are considered primary target population. If only the number of residences is known, use the average county residents per household (rounded up to the next integer) to determine the population. In the space provided, enter this population. Multiply the population by 10 to determine the Primary Target Population score. Note that if you do not suspect a release, there can be no primary target population.

4. **Secondary Target Population:** Evaluate populations in distance categories not suspected to be subject to exposure from release of a hazardous substance from the site. If you suspect a release, residents, students, and workers in the ¼- to 4-mile distance categories are secondary target population. If you do not suspect a release, all residents, students, and workers onsite and within 4 miles are considered secondary target population.

Use PA Table 8 (page 23). Enter the population in each secondary target population distance category, circle the assigned value, and record it on the far-right side of the table. Sum the far-right column and enter the total as the Secondary Target Population factor score.

5. **Nearest Individual** represents the threat posed to the person most likely to be exposed to a hazardous substance release from the site. If you have identified a primary target population, enter 50. Otherwise, assign the score from PA Table 8 (page 23) for the closest distance category in which you have identified a secondary target population.

6. **Primary Sensitive Environments:** If a release is suspected, all sensitive environments on or within ¼ mile of the site are considered primary targets. List them and assign values for sensitive environment type (from PA Table 5, page 16) and/or wetland acreage (from PA Table 9, page 23). Sum the values and enter the total as the factor score.

7. **Secondary Sensitive Environments:** If a release is suspected, sensitive environments in the ¼- to ½-mile distance category are secondary targets; greater distances need not be evaluated because distance weighting greatly diminishes the impact on site score. If you do not suspect a release, all sensitive environments on and within ½ mile of the site are considered secondary targets. List each secondary sensitive environment on PA Table 10 (page 23) and assign a value to each using PA Tables 5 and 9. Multiply each value by the indicated distance weight and record the product in the far-right column. Sum the products and enter the total as the factor score.

8. **Resources:** A score of 5 can generally be assigned as a default measure. Assign zero only if there is no land resource use within ½ mile.

Sum the target scores in Column A (Suspected Release) or Column B (No Suspected Release).

Waste Characteristics (WC)

9. **Waste Characteristics:** Score is assigned from page 4. However, if you have identified any primary target for the air pathway, assign either the score calculated on page 4 or a score of 32, whichever is greater.

Air Pathway Score: Multiply the scores for LR, T, and WC. Divide the product by 82,500. Round the result to the nearest integer. If the result is greater than 100, assign 100.

AIR PATHWAY SCORESHEET

Pathway Characteristics	
Do you suspect a release (see Air Pathway Criteria List, page 21)?	Yes ___ No ✓
Distance to the nearest individual:	2000 ft

	A Suspected Release	B No Suspected Release	References
LIKELIHOOD OF RELEASE			
1. SUSPECTED RELEASE: If you suspect a release to air (see page 21), assign a score of 550. Use only column A for this pathway.			—
2. NO SUSPECTED RELEASE: If you do not suspect a release to air, assign a score of 500. Use only column B for this pathway.		500	1
LR =		500	
TARGETS			
3. PRIMARY TARGET POPULATION: Determine the number of people subject to exposure from a suspected release of hazardous substances to the air. ____ people x 10 =			—
4. SECONDARY TARGET POPULATION: Determine the number of people not suspected to be exposed to a release to air, and assign the total population score using PA Table 8.		81	5
5. NEAREST INDIVIDUAL: If you have identified any Primary Target Population for the air pathway, assign a score of 50; otherwise, assign the Nearest Individual score from PA Table 8.		2	2,8
6. PRIMARY SENSITIVE ENVIRONMENTS: Sum the sensitive environment values (PA Table 5) and wetland acreage values (PA Table 9) for environments subject to exposure from a suspected release to the air.			
Sensitive Environment Type / Value: ____ / ____; ____ / ____			
Sum =			—
7. SECONDARY SENSITIVE ENVIRONMENTS: Use PA Table 10 to determine the score for secondary sensitive environments.		7	2,6,10
8. RESOURCES		5	—
T =		95	
WASTE CHARACTERISTICS			
9. A. If you have identified any Primary Target for the air pathway, assign the waste characteristics score calculated on page 4, or a score of 32, whichever is GREATER; do not evaluate part B of this factor.			
B. If you have NOT identified any Primary Target for the air pathway, assign the waste characteristics score calculated on page 4.		32	
WC =		32	

AIR PATHWAY SCORE: $\dfrac{LR \times T \times WC}{82{,}500}$ = 18.4

PA TABLE 8: VALUES FOR SECONDARY AIR TARGET POPULATIONS

Distance from Site	Population	Nearest Individual (choose highest)	Population Within Distance Category: 1 to 10	11 to 30	31 to 100	101 to 300	301 to 1,000	1,001 to 3,000	3,001 to 10,000	10,001 to 30,000	30,001 to 100,000	100,001 to 300,000	300,001 to 1,000,000	Greater than 1,000,000	Population Value
Onsite	52	20	1	2	(5)	16	52	163	521	1,633	5,214	16,325	52,136	163,246	5
>0 to ¼ mile	388	20	1	1	1	4	(13)	41	130	408	1,303	4,081	13,034	40,811	13
>¼ to ½ mile	1730	(1)	0	0	1	1	3	(9)	28	88	282	882	2,815	8,815	9
>½ to 1 mile	9344	1	0	0	0	1	1	3	(8)	26	83	261	834	2,612	8
>1 to 2 miles	35433	0	0	0	0	0	1	1	3	8	(27)	83	266	833	27
>2 to 3 miles	51455	0	0	0	0	0	1	1	1	4	(12)	38	120	378	12
>3 to 4 miles	57697	0	0	0	0	0	0	1	1	2	(7)	23	73	229	7
Nearest Individual =		2											Score =		81

PA TABLE 9: AIR PATHWAY VALUES FOR WETLAND AREA

<450

Wetland Area	Assigned Value
Less than 1 acre	0
1 to 50 acres	(25)
Greater than 50 to 100 acres	75
Greater than 100 to 150 acres	125
Greater than 150 to 200 acres	175
Greater than 200 to 300 acres	250
Greater than 300 to 400 acres	350
Greater than 400 to 500 acres	450
Greater than 500 acres	500

PA TABLE 10: DISTANCE WEIGHTS AND CALCULATIONS FOR AIR PATHWAY SECONDARY SENSITIVE ENVIRONMENTS

Distance	Distance Weight	Sensitive Environment Type and Value (from PA Table 5 or 9)		Product
Onsite	0.10	x Biotic communities 25		2.5
		x		
0-1/4 mi	0.025	x Biotic communities 50		2.5
		x State-designated wildlife 50		
		x		
1/4-1/2mi	0.0054	x Biotic communities 50		
		x State-designated wildlife 150		
		x Spawning areas 75	375	2.025
		x migratory pathways 75		
		Wetlands 25		
		Total Environments Score =		7.025

Assume 7.0

SITE SCORE CALCULATION

In the column labeled S, record the Ground Water Pathway score, the Surface Water Pathway score, the Soil Exposure Pathway score, and the Air Pathway score. Square each pathway score and record the result in the S^2 column. Sum the squared pathway scores. Divide the sum by 4, and take the square root of the result to obtain the Site Score.

SUMMARY

Answer the summary questions, which ask for a qualitative evaluation of the relative risk of targets being exposed to a hazardous substance from the site. You may find your responses to these questions a good cross-check against the way you scored the individual pathways. For example, if you scored the ground water pathway on the basis of no suspected release and secondary targets only, yet your response to question #1 is "yes," this presents apparently conflicting conclusions that you need to reconsider and resolve. Your answers to the questions on page 24 should be consistent with your evaluations elsewhere in the PA scoresheets package.

SITE SCORE CALCULATION

	S	S^2
GROUND WATER PATHWAY SCORE (S_{gw}):	10.3	106.1
SURFACE WATER PATHWAY SCORE (S_{sw}):	5.23	27.4
SOIL EXPOSURE PATHWAY SCORE (S_s):	4.1	16.8
AIR PATHWAY SCORE (S_a):	18.4	338.6
SITE SCORE: $\sqrt{\frac{S_{gw}^2+S_{sw}^2+S_s^2+S_a^2}{4}}$		11.1

SUMMARY

	YES	NO
1. Is there a high possibility of a threat to any nearby drinking water well(s) by migration of a hazardous substance in ground water?	☐	☒
A. If yes, identify the well(s). _____		
B. If yes, how many people are served by the threatened well(s)? _____		
2. Is there a high possibility of a threat to any of the following by hazardous substance migration in surface water?		
A. Drinking water intake	☐	☒
B. Fishery	☐	☒
C. Sensitive environment (wetland, critical habitat, others)	☐	☒
D. If yes, identify the target(s). _____		
3. Is there a high possibility of an area of surficial contamination within 200 feet of any residence, school, or daycare facility?	☐	☒
If yes, identify the property(ies) and estimate the associated population(s). _____		
4. Are there public health concerns at this site that are not addressed by PA scoring considerations? If yes, explain: _____	☐	☒

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REMEDIAL PLANNING ACTIVITIES AT SELECTED UNCONTROLLED HAZARDOUS SUBSTANCE DISPOSAL SITES IN THE ZONE OF EPA REGIONS VI, VII, AND VIII

U. S. EPA CONTRACT NO.: 68-W9-0021

FINAL REPORT
FOR
ENVIRONMENTAL PRIORITIES INITIATIVE
PRELIMINARY ASSESSMENTS

at
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Davenport, Iowa

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